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DRAFT Conclusion summary for EWA salmonid protection DRAFT

Following statement is relevant to all fishery effects evaluations, not just salmonids:

Progressively better protection was provided for some fish species in the Delta by the new regulatory requirements that were added throughout the historical reference period (1991-1995). These changing requirements in the historical period complicated the assessment of EWA effects on fish salvage or survival indices, especially the comparisons of the historical condition with either the modeled base or the EWA simulation, both having a fixed set of underlying requirements for all years in each game. Water users assert that such comparisons also may be confounded by water demand differences between the historical operations and the base and EWA simulations.

Salmonid Evaluation - summary

1. EWA consequences for salmon were assessed by comparing entrainment losses and Delta survival indices estimated using several survival models. For the Sacramento Basin salmon, one survival model indicated larger changes in survival due to changes in Delta operations than the other two models. These models respectively define the conflicting hypotheses on how much CVP/SWP exports affect Delta salmon survival. No survival model is available relating steelhead survival to Delta conditions.

2. EWA actions simultaneously reduced entrainment and improved Delta survival of juvenile salmon by reducing SWP/CVP exports and augmenting river flows into the Delta during selected periods from October to June. Curtailments focused on periods of high fish densities in the Delta, based on interpretation of the historical CVP/SWP salvage records from 1991-1995. Actions were taken to protect all four chinook races from the Sacramento Basin and fall-run chinook from the San Joaquin Basin. Most of these races are not abundant, hence, actions sometimes were taken when only a few salmon were present in the historical salvage.

3. By curtailing exports during periods of high salmon densities in the south Delta, EWA actions can be more effective (more salmon saved) at those times than prescribed monthly export limits. When more fish are saved per acre-foot export change, the efficiency of fishery protection also is increased. Both increased effectiveness and increased efficiency can be achieved with an EWA. At times, both may be achieved simultaneously. Targeted curtailments lack the safety margins associated with more traditional protection measures and, therefore, require

monitoring of sufficient intensity to detect variation in migration timing of rare races.

4. EWA modifications of base operations almost always increased Delta salmon survival relative to the base condition. The EWA simulation occasionally produced substantially lower Delta survival for some salmon races than was estimated for the historical period, particularly in wet years (1993 and 1995) of late-Stage 1simulations when, compared to early-Stage 1, more new facilities were being used to meet a water demand greater than the historical demand. This outcome also occurred a few times in the "prescriptive standards" simulation. Survival lower than in the historical period is not conducive to species recovery and suggests EWA actions or the prescriptions were not sufficient to offset the adverse effects of the base run operations. On other occasions, lower salmon survival resulted from increases in exports that were needed to reduce EWA water debts, suggesting EWA assets were inadequate to support fish protection actions that had been taken previously, resulting in species protection tradeoffs.

5. Due to substantial overlap in Delta occurrence, actions to protect salmon often benefitted multiple races and other species, including steelhead. (Steelhead entrainment loss in the Delta is not a serious problem because almost all steelhead survive the fish salvage system.) Juvenile salmonids also benefitted from actions taken to protect delta smelt or splittail.

6. Upstream habitat benefits of EWA water acquisition and management also were considered. Upstream water releases associated with EWA operation are likely to increase the capacity and flexibility managers have to improve upstream habitat conditions for salmonids. Achieving these benefits requires that EWA operations do not constrain other upstream programs designed to improve conditions for fish. Upstream benefits cannot be estimated quantitatively, in part because the simulations were not specific about which streams were subject to flow manipulations by EWA water management.